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EXAMINER
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CHEN, ERIC BRICE

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 03/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/762,514

Applicant(s)

MINAMIHABA ET AL.

Examiner

Eric B. Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3, 7-10 and 21-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7-10 and 21-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 10/303,855.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 7-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Yano et al. (U.S. Patent No. 6,740,590).

3. The applied reference has a common assignee with the instant application.

Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

4. As to claim 1, Yano discloses a polishing slurry for CMP (column 1, lines 14-15) of Cu (column 11, lines 17-24), which comprises: a first complexing agent containing quinaldinic acid; and a second complexing agent containing quinolinic acid (column 12, lines 34-47). Because quinaldinic acid and quinolinic acid are organic acids that

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improve and increase polishing rates (column 11, lines 9-13; column 12, lines 33-34), they inherently act as complexing agents to facilitate the removal of metal.

5. As to claim 7, Yano discloses that the polishing slurry further comprises an oxidizing agent selected from the group consisting of hydrogen peroxide (column 11, lines 31-33).

6. As to claim 8, Yano discloses that that the polishing slurry further comprises polishing particles comprising a material selected from the group consisting of silica, alumina, zirconia and ceria (column 7, lines 7-9).

7. As to claim 9, Yano discloses that the polishing slurry further comprises a polishing rate promoting agent selected from the group consisting of glycine (column 16, lines 25-31).

8. As to claim 10, Yano discloses that the polishing slurry further comprises a surfactant (column 12, lines 58-60).

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yano.

12. The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

13. As to claim 2, Yano does not expressly disclose a mixing ratio of said first complexing agent to said second complexing agent is within the range of 2:8 to 8:2 based on weight. However, Yano discloses that concentration of organic acids can be varied (column 12, lines 52-57). Moreover, Yano teaches, by disclosing that the organic acids be varied, that changing the concentration appears to reflect a result-effective variable which can be optimized. See MPEP § 2144.05 II. Organic acid concentration (or ratio) can be varied according, depending on the desired outcome the CMP step. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a mixing ratio of said first complexing agent to said second complexing agent is within the range of 2:8 to 8:2 based on weight. One who is skilled in the art would be motivated to optimize through routine experimentation of complexing agent concentrations or ratios. See MPEP § 2144.05 II.

14. As to claim 3, Yano does not expressly disclose a mixing ratio of said first complexing agent to said second complexing agent is within the range of 4:6 to 6:4 based on weight. However, Yano discloses that concentration of organic acids can be varied (column 12, lines 52-57). Moreover, Yano teaches, by disclosing that the organic acids be varied, that changing the concentration appears to reflect a result-effective variable which can be optimized. See MPEP § 2144.05 II. Organic acid concentration (or ratio) can be varied according, depending on the desired outcome the CMP step. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a mixing ratio of said first complexing agent to said second complexing agent is within the range of 4:6 to 6:4 based on weight. One who is skilled

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in the art would be motivated to optimize through routine experimentation of complexing agent concentrations or ratios. See MPEP § 2144.05 II.

***Claim Rejections - 35 USC § 103***

15. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yano, in view of Uchikura et al. (U.S. Patent No. 6,579,153).

16. As to claim 21, Yano discloses that the polishing particles comprise silica (column 7, lines 7-9). Yano does not expressly disclose that the polishing particles comprises colloidal silica. However, Uchikura discloses a polishing slurry for CMP of Cu (column 2, lines 39-42), including the use of colloidal silica (column 7, lines 57-62). Moreover, Uchikura's polishing slurry can produce sufficiently flattened copper, barrier metal film, and insulating film surfaces with high precision (column 2, lines 53-58). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use colloidal silica. One who is skilled in the art would be motivated to use a polishing slurry for CMP that produces sufficiently flattened copper, barrier metal film, and insulating film surfaces with high precision.

17. As to claim 22, Yano does not expressly disclose that the surfactant is one selected from the group consisting of potassium dodecylbenzenesulfonate and ammonium dodecylbenzenesulfonate. However, Uchikura discloses a polishing slurry for CMP of Cu (column 2, lines 39-42), including potassium dodecylbenzenesulfonate and ammonium dodecylbenzenesulfonate surfactants (column 13, lines 40-43). Moreover, Uchikura's polishing slurry can produce sufficiently flattened copper, barrier

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metal film, and insulating film surfaces with high precision (column 2, lines 53-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a surfactant selected from the group consisting of potassium dodecylbenzenesulfonate and ammonium dodecylbenzenesulfonate. One who is skilled in the art would be motivated to use a surfactant from a polishing slurry for CMP that produces sufficiently flattened copper, barrier metal film, and insulating film surfaces with high precision.

***Claim Rejections - 35 USC § 103***

18. Claims 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yano, in view of Kakizawa et al. (U.S. Patent No. 6,310,019).

19. As to claim 23, Yano does not expressly disclose that the surfactant is acetylene diol-based nonion. However, Kakizawa discloses a cleaning fluid for CMP Cu (column 2, lines 27-24), including acetylene diol-based nonion surfactant (column 2, lines 35-49; column 3, lines 10-15; column 5, lines 1-10, lines 35-40). Kakizawa's cleaning fluid has the advantage of not causing corrosion/oxidation or surface roughness on the copper surface (column 2, lines 27-34). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an acetylene diol-based nonion surfactant. One who is skilled in the art would be motivated to use a surfactant from a formulation that has the advantage of not causing corrosion/oxidation or surface roughness on the copper surface.



***Claim Rejections - 35 USC § 103***

20. Claims 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yano, in view of Uchikura, in further view of Kakizawa.

21. As to claim 24, Yano does not expressly disclose that the surfactant comprises potassium dodecylbenzenesulfonate and acetylene diol-based nonion. However, Uchikura discloses a polishing slurry for CMP of Cu (column 2, lines 39-42), including potassium dodecylbenzenesulfonate and ammonium dodecylbenzenesulfonate surfactants (column 13, lines 40-43). Moreover, Uchikura's polishing slurry can produce sufficiently flattened copper, barrier metal film, and insulating film surfaces with high precision (column 2, lines 53-58). Kakizawa discloses a cleaning fluid for CMP Cu (column 2, lines 27-24), including an acetylene diol-based nonion surfactant (column 2, lines 35-49; column 3, lines 10-15; column 5, lines 1-10, lines 35-40). Kakizawa's cleaning fluid has the advantage of not causing corrosion/oxidation or surface roughness on the copper surface (column 2, lines 27-34). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a surfactant comprising potassium dodecylbenzenesulfonate and acetylene diol-based nonion. One who is skilled in the art would be motivated to use a surfactant from a polishing slurry for CMP that produces sufficiently flattened copper, barrier metal film, and insulating film surfaces with high precision. Moreover, one who is skilled in the art would be motivated to use a surfactant from a formulation that has the advantage of not causing corrosion/oxidation or surface roughness on the copper surface. Furthermore,

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one who is skilled in the art would be motivated to combine two surfactants, both of which have beneficial properties when treating copper.

### ***Response to Arguments***

22. In view of Applicants' English translation of Japanese Patent Application No. 2001-366938 and a statement that the translation of the certified copy is accurate, filed Jan. 19, 2006, Applicants are entitled to the priority date of Nov. 30, 2001. Thus, the Helling reference is not prior art and rejection of claims 1-3, 7-10, and 21-24 under 35 U.S.C. 103(a) is withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Yano.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Chen whose telephone number is (571) 272-2947. The examiner can normally be reached on Monday through Friday, 8AM to 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EBC  
Mar. 9, 2006

EBC

NADINE G. NORTON  
SUPERVISORY PATENT EXAMINER

